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GR

Installation and Operating Instructions

SDA

Flap-type flowmeter for liquid measurements

Note **In case of instruments which are explosion protec please observe the supplementary installation and operating instructions:**

SDA/... Kat. II2G with electr. internals Id. Nr. 702529##00

Variable area flowmeters
Vortex flowmeters
Flow controllers
Electromagnetic flowmeters
Ultrasonic flowmeters
Mass flowmeters
Level measuring instruments
Communications technology
Engineering systems & solutions
Switches, counters, displays and recorders
Heat metering
Pressure and temperature

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Product liability and warranty

The flowmeter is suitable for measuring the volume flow of liquids.

Special regulations apply for use in explosion-hazardous areas. (Refer to the section on the scope of delivery.)

Responsibility for the suitability and usage to the intended purpose of these flowmeters rests solely with the operator.

Improper installation or improper operation of the flowmeters may lead to the loss of warranty. In addition, the "General conditions of sale" which form the basis of the purchase contract are applicable.

The calculation of the pressurized parts is effected with allowance for corrosion, erosion through abrasion or cavitation.

If the flowmeter needs to be returned to KROHNE Messtechnik, please note the information at the end of these installation and operating instructions.

Scope of delivery

- Installation and operating instructions Ident. No.: 702124##00
- Supply without installation accessories (screw bolts, flange seal and cabling)

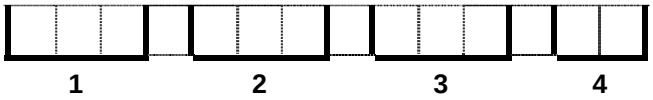
Special certificates (supplied to order only)

- Test certificate to EN 10204:
- Pressure test, paint penetration test, irradiation test, leak test, ultrasonic test, helium leakage test,
- Cleaning pursuant to works regulations
- Calibration certificate

1 General

1.1 Description code

The description code consists of the following elements: *)



1 Series measuring unit **SDA**

2 Display part series
- **M9** : Standard indicator
- **M9S** : with added corrosion prevention
- **M9R** : Stainless steel housing

3 Electrical signal output
- **ESK** : Analog signal output

4 Limit switch
- **K1** : One limit switch
- **K2** : Two limit switches

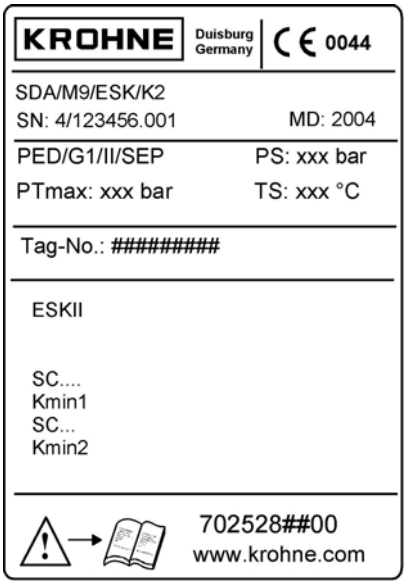
*) Positions which are not used in the description code are not required.

1.2 Marking

The type marking of the complete instrument is carried out at the display part by means of the rating plates shown here (also refer to the description code).

Example:

MD:	Year of manufacturing
PS:	Max. permissible operating pressure at max. permissible operating temperature TS
PT max:	Maximum pressure tested
TS:	Max. operating temperature
PED:	Directive for Pressure Equipment
Tag No :	Measuring point tag
0044:	Identification number of the supervising office for EC Directive for Pressure Equipment 97/23/EC
SN:	Serial number
SO:	Sales order / item
KO:	KROHNE order
Vxxxx…:	Product configurator code
AC:	Article code



1.3 Key for Pressure Equipment Directive

PED	/			/		/	
1		2	3		4		5

1 **P**ressure **E**quipment **D**irective

2 **Fluid**

G Gases, liquefied gases, gases dissolved under pressure, vapors and those liquids whose vapor pressure lies **more than 0.5 bars** over the normal atmospheric pressure (1013 mbars) at the maximum permissible temperature

L Liquids whose vapor pressure lies a **maximum of 0.5 bars** above the atmospheric pressure at the maximum permissible temperature

3 **Fluid group**

1 Group 1: Explosion-hazardous, highly flammable, readily flammable, flammable (when the maximum permissible temperature lies above the flash point), highly toxic, toxic, fire stimulating

2 Group 2: All the fluids not specified in Group 1

4 **Category**

3.3 In accordance with Article 3.3 of Directive 97/23/EC
I Category I to 97/23/EC
II Category II to 97/23/EC
III Category III to 97/23/EC

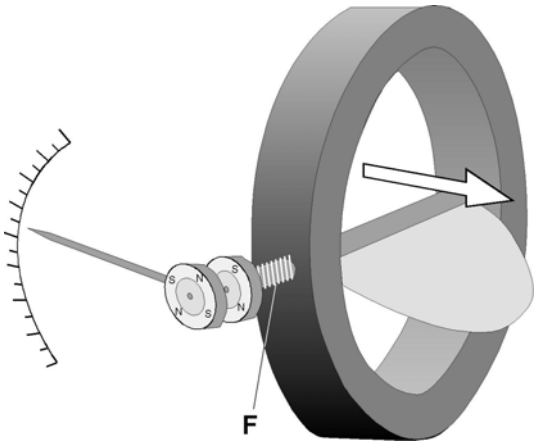
5 **Conformity evaluation process**

SEP Solid engineering practice
A Module A internal process inspection
A1 Module A1 internal process inspection with supervision of the acceptance
H Module H Comprehensive quality assurance

The PED key marking is contained on the rating plate of the instrument.

1.4 Functional principle

A half-round plate, or flap, is fastened across the direction of flow to a springmounted rotating spindle in a ring that is inserted between flanges in a pipeline. As the flow rate increases, the flap rotates counter to the restoring force *F* of the spring in the direction of flow.
The ensuing angle of rotation, depending on the volume rate of flow, is transmitted via a magnetic coupling to the indicator part.



2 Installation and Start-up

2.1 Prerequisite for the installation

The operating pressure of the plant may not exceed the value indicated on the rating plate.

Ensure that the parts coming into contact with the medium are compatible with the material.

The ambient and medium temperatures may not exceed certain maximum values.

In order to prevent distortions the connecting flanges have to face each other axially and in parallel.

2.3 Preparation of the pipeline

Generally comply with the maximum pressure and maximum temperature levels allowable for the SDA at the measuring point in your plant. The direction of flow must be the same as that indicated by the flow arrow on the device.

Drain the pipelines before installing the device.

Use gaskets made of rubber or SIL; for plastics devices, use only gaskets made of rubber with a Shore hardness A of approx. 65°.

The gaskets should not project into the pipeline and the flow meter must be in line with the pipe axis, otherwise measurements would be falsified and/or the device could jam.

Incorporating the indicator part in the equipotential bonding system in the hazardous area: The indicator part must be earthed. This can be done e.g. using a wire jumper between the flange on the indicator part and a pipe flange on the main pipeline with cable lugs appropriate for the bolted connection (not included with the flow meter!).

Incorporating the indicator in the lightning protection system (if necessary). The Operator is responsible for checking and determining the scope!

2.4 Observance of the IP degree (NEMA Type) of protection

The following instructions are to be observed in order to observe the IP degree (Nema Type) of electrical built-in parts:

- After the connecting cable has been introduced, tighten the outlet nut.
- All the cable glands which are not used remain closed with blanking plugs.
- Do not kink lines directly at the cable gland.
- Provide a drain bend
- The feed lines may not be subjected to mechanical strains. Refer to the description of the electrical supplementary components for this device.

Cable glands / screwed glands:

Thread	Material	Line diameter	Degree of protect	Remark
M 16x1.5	PA	5 - 10 mm	IP 68 - 5 bars	Standard
M 20x1.5	PA	8 - 13 mm	IP 68 - 5 bars	
M 16x1.5	Nickel-plated bras	5 - 9 mm	IP 68 - 5 bars	
M 20x1,5	Nickel-plated bras	10 - 14 mm	IP 68 - 10 bar	

* Degree of protection is limited here to the cable screwed gland

3 Flow table

Reference conditions: Water at 20°C

The turn-down range amounts to 10 : 1

The specified pressure losses apply for water and air at the maximum flow rate.

Nominal size		**Flow Water**	
DN	**Inch**	**m3/h**	**US GPH**
25	1	6 - 12	1585 - 3170
32	1 1/4"	8 - 15	2113 - 3962
40	1 1/2"	6 - 25	1585 - 6604
50	2"	5 - 30	1320 - 7925
65	2 1/2"	20 - 80	5283 - 21133
80	3"	40 - 80	10566 - 21133
100	4"	40 - 120	10566 - 31700
125	5"	65 - 150	17171 - 39625
150	6"	80 - 225	21133 - 59438
200	8"	150 - 350	39625 - 92460
250	10"	150 - 350	39625 - 92460
300	12"	250 - 750	66043 - 198129

4 Materials

Ring	Steel Stainless steel 1.4571 PVC (up to DN300) PP (up to DN300) PVDF (up to DN300)
Corrosion protection for steel version	Epoxy, stove enamelled, colour: blue, RAL 5017
Scale casing	Aluminium, painted
Pointer	Aluminium, painted
Scale	Aluminium, coated
Pane	Float glass

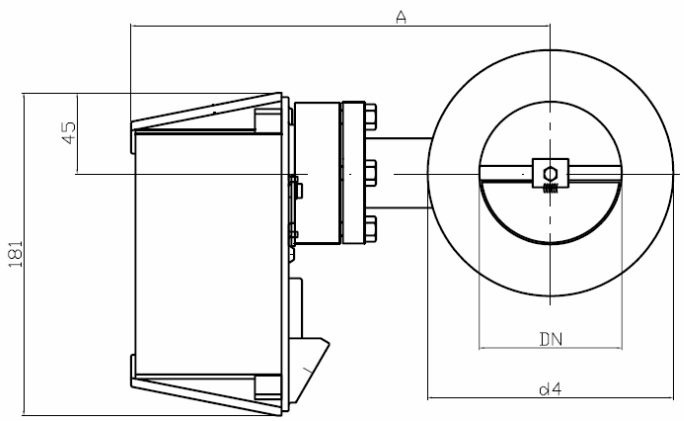
5 Technical Data

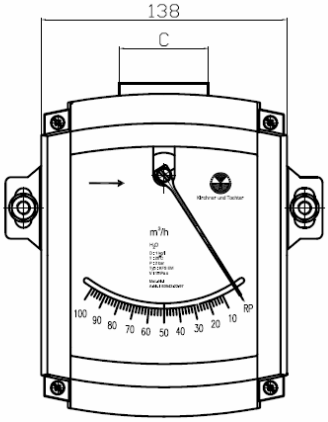
Flow range	min max	0,5 ... 6 m^3/h Water 150 ... 1500 m^3/h Water
Accuracy		5% FS
Turndown ratio		min. 1 : 10
Nominal sizes		DN25 ... DN300
Max. Operating pressure	Standard Option	PN 6/10 PN 16/25/40
Mounting length Special spring	Standard	50 mm 60mm
Connection	Standard Option	Mounting between welding neck flanges to DIN 2501 ASME, JIS
Degree of protection, indicator part		IP 67

6 Measuring temperatures

Type of	Steel, stainless steel	- 70° C ... + 200° C
	PVC	0° C ... + 20° C /10bar - 0° C ... + 40° C /6bar
	PP	0° C ... + 20° C /10bar - 0° C ... + 80° C /1,5bar
	PVDF	-40° C ... + 20° C /10bar - -40° C ... + 140° C / 2bar

7 Dimensions





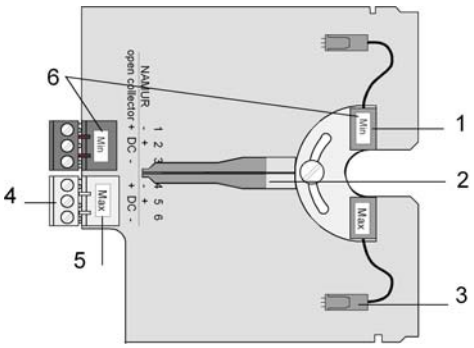
DN	**d4** [mm]	**A** [mm]
25	68	232,5
32	78	236,0
40	88	240,0
50	102	245,0
65	122	252,5
80	138	260,0
100	158	270,0
125	188	282,5
150	212	295,0
200	268	320,0
250	320	345,0
300	370	370,0
350	430	395,0
400	482	420,0
500	585	485,0
600	685	530,0

Standard ring C = 50mm (Option: 60mm)

8 Indicator part

8.1 Contact inserts

The flowmeter SDA can be equipped with a maximum of two electronic limit switches.
The limit switch functions with a slot-type initiator which is operated inductively through the semicircular metal vane belonging to the measuring pointer. The switching points are set through the contact pointer. The setting of the contact pointer serves at the same time for the optical display of the set limit.



Contact types:

SC3,5-N0-Y	2-wire technology (NAMUR)
SJ3,5-SN	2-wire technology safety-oriented
SJ3,5-S1N	2-wire technology safety-oriented (inverted)
SB 3.5-E2	3-wire technology

1 Limit switch
2 Contact pointer
3 Connecting plug
4 Connecting terminal
5 Terminal socket

8.1.1 Electrical connection

The housing cover of the M9 display has to be removed in order to connect the contact insert. The connecting terminals (4) have a pluggable design and can be removed in order to connect the lines. The built-in contact types are listed in the rating plate of the display.

Electrical connection of the limit switches in 2-wire technology

Connection assignment for
SC3,5-N0-Y
SJ3,5-SN
SJ3,5-S1N

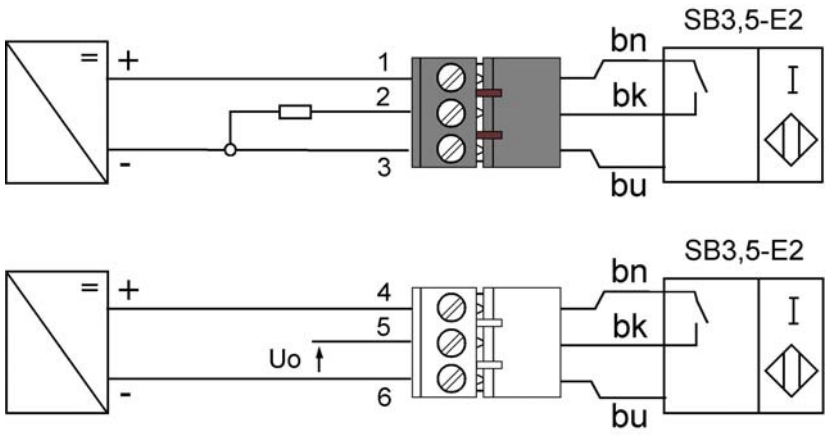
Contact	MIN			MAX		
Connector color	black			gray		
Labeling	1	2	3	4	5	6
2-wire technology	-	+		-	+	

Electrical connection of the limit switches in 3-wire technology

Connection assignment for
SB3,5-E2

Contact	MIN			MAX		
Connector color	black			gray		
Labeling	1	2	3	4	5	6
3-wire technology	+	DC	-	+	DC	-

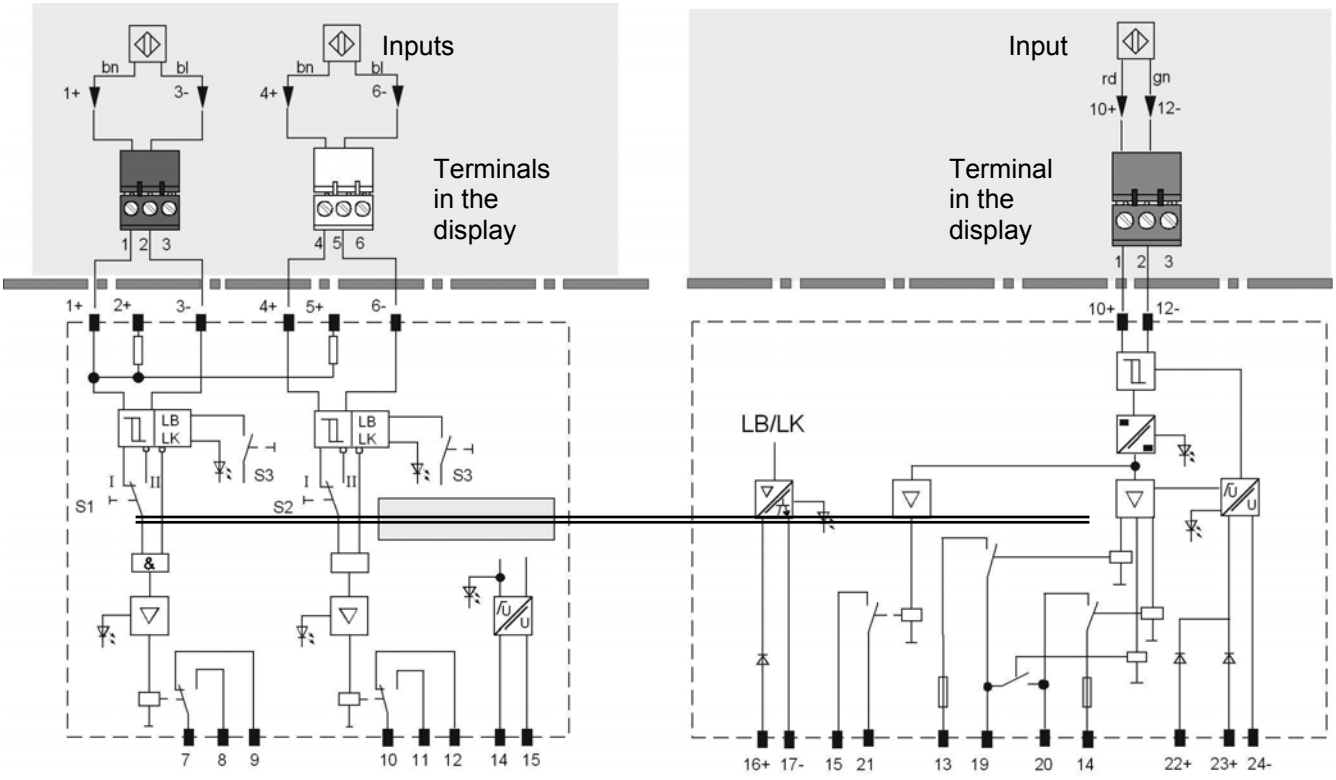
Connection diagram 3-wire technology

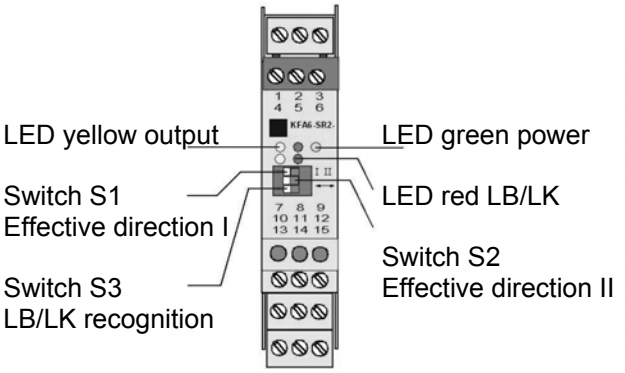


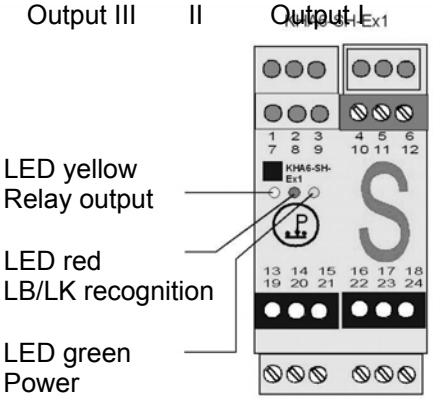
Connection diagram 2-wire technology

NAMUR
SC3,5-N0-Y

Safety-oriented *
SJ3,5-SN and SJ3,5-S1N







LB : Line break
LK : Line short-circuit

* Safety-oriented isolating switching amplifiers are only single-channel!

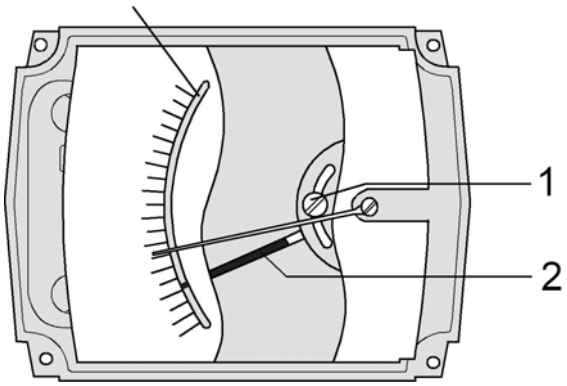
8.1.2 Limit setting

The setting is carried out directly via the contact pointer (2):

- Slide the scale away
- Loosen the locking screw (1) slightly
- Slide the scale back to the latching point
- Set the contact pointer (2) to the desired switching point
- After setting, the contact pointer (2) is to be fastened hand-screwed again with the locking screw (1) (max. 40 Ncm).
- Screw on the housing cover.

.

Scale opening



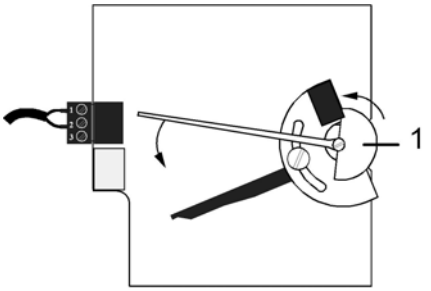
8.1.3 Switch contact definition

MIN contact

If the pointer vane (1) enters the slot, an alarm is triggered. If the pointer vane lies outside the slot initiator, a wire break also causes the alarm to be triggered.

No wire break recognition at SB3,5-E2

Option: Implementation as a maximum contact
In the alarm status the vane lies outside the slot.
Wire break recognition is not available here.

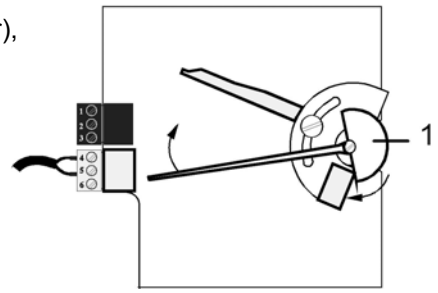


MAX contact

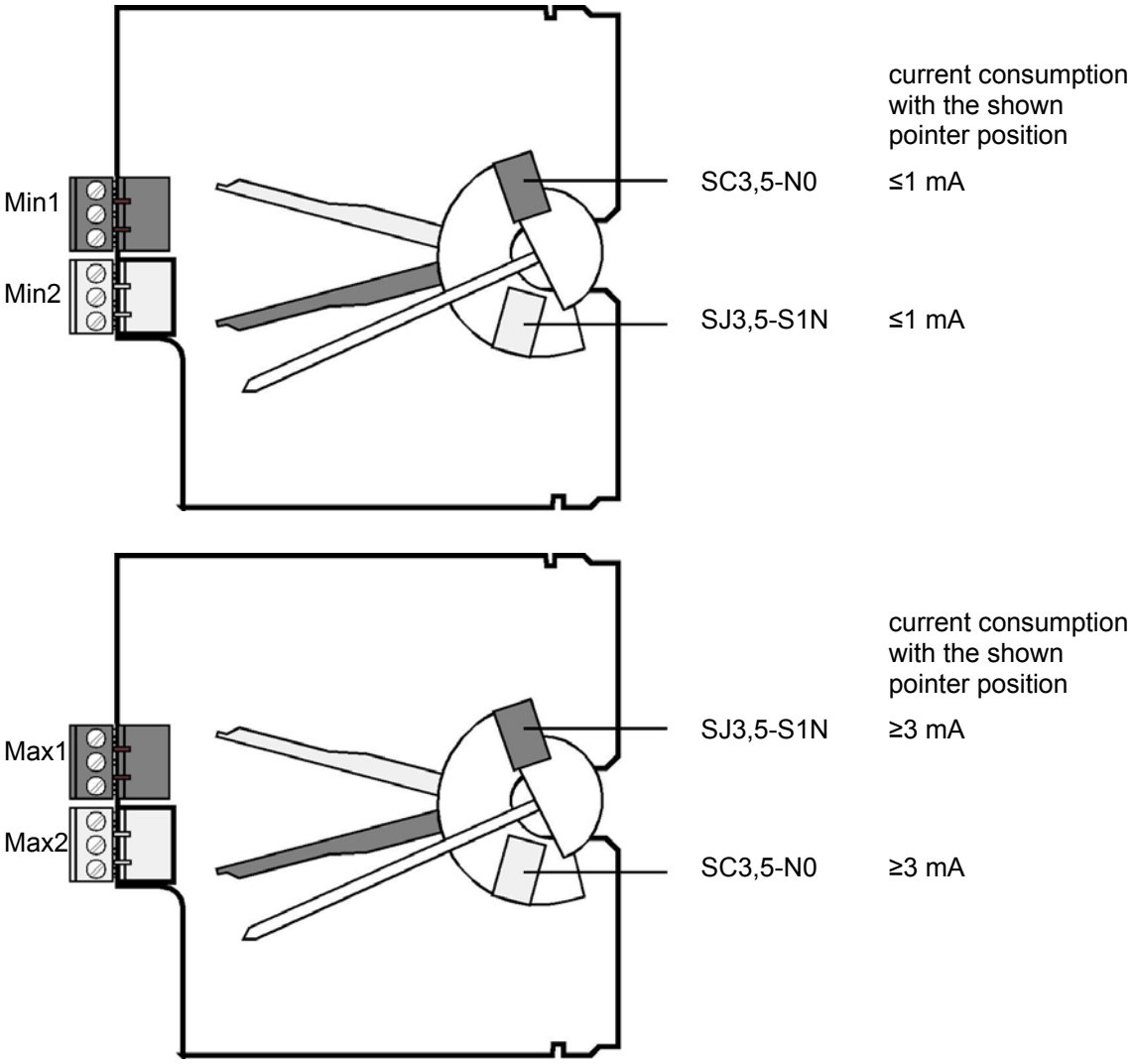
If the pointer vane (1) enters the slot (and thus dampens this initiator), an alarm is triggered. If the pointer vane lies outside the slot initiator, a wire break also causes the alarm to be triggered.

No wire break recognition at SB3,5-E2

Option: Implementation as a minimum contact
In the alarm status the vane lies outside the slot.
Wire break recognition is not available here.



Definition of Min1 and Min2 / Max1 and Max2



8.1.4 Technical data of limit switches

	SC3,5-N0-Y	SJ3,5-SN	SJ3,5-S1N	SB3,5-E2
	2-wire	2-wire	2-wire	3-wire
	NAMUR	NAMUR	NAMUR	
Switching element function	NC contact	NC contact	NO contact	NO contact PNP
Nominal voltage U0	8 V	8V	8V	10 to 30 V
Power consumption:				
Pointer vane not detected	≥ 3 mA	≥ 3 mA	≤ 1 mA	≤ 0.3 V
Pointer vane detected	≤ 1 mA	≤ 1 mA	≥ 3 mA	Ub - 3 V
Continuous current	-	-	-	max. 100 mA
No-load current I0	-	-	-	≤ 15 mA

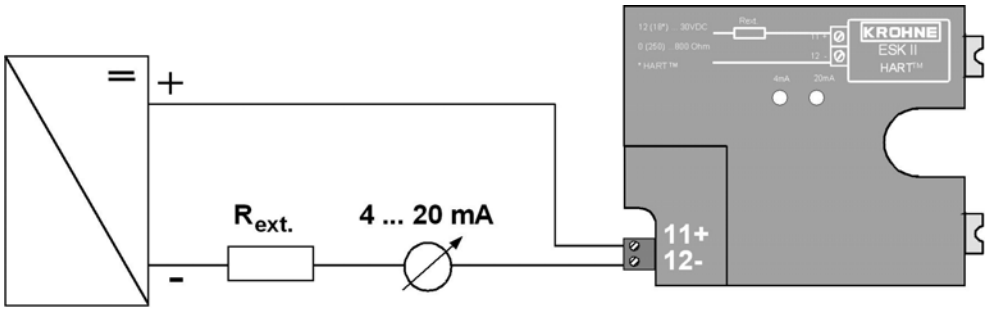
An isolating switching amplifier, e.g. Pepperl + Fuchs Series KF .. -SR2 ..., is required in order to operate the **SC3,5-N0-Y** limit switch (refer to the chapter on the spare part list).

SJ3,5-SN and **SJ3,5-S1N** limit switches safety-oriented are connected to a safety-oriented isolating switching amplifier, e.g. Pepperl + Fuchs K… –SH- ... (large S on the front)

8.2 Electrical signal output ESK

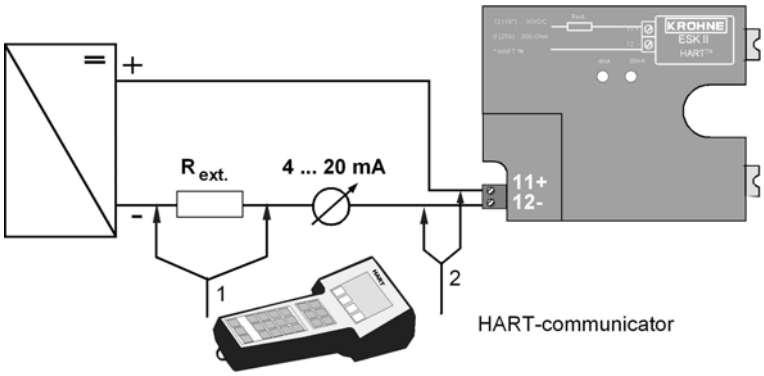
8.2.1 Electrical connection

The connecting terminals of the M9 display have a pluggable design and can be removed in order to connect the lines.



8.2.2 HART™ communication with the ESK

HART™ communication is not compellingly required in order to operate the ESK.
When HART™ communication is carried out with the ESK, this does not by any means impair analog measured value transfer (4...20mA)
Exception at Multidrop operation. In Multidrop operation a maximum of 15 instruments with HART™ function can be operated in parallel, whereby their current outputs are switched inactive (approx. 4 mA).



If a HART™ communicator (type Fisher Rosemount, Model 275) or a PC with HART™ modem PC is used, the resistor which is connected in series ($R_{ext.}$) has to exceed 250 Ohms.

In this type of operation the auxiliary power must amount to at least 18 V. The communicator or the PC is connected as shown in the drawing above.

It can be operated optionally via the connecting terminals of the ESK (2) or via an external resistance (1) connected in series. The counter cannot be read out or operated by means of HART™ communication!

8.2.3 Technical data of ESK II

Auxiliary power	12 (18 *) to 30 V DC
Measurement signal	4.00 to 20.00 mA for 0 to 100 % flow value > 20.8 mA for alarm status
Auxiliary power influence	< 0.1%
Dependency on external resistance	< 0.1%
Temperature influence	< 5 μA / K
Max. external resistance / load	0 (250 *) to 800 Ohms

* These values are to be observed as minimum values during HART™ communication.

9 Service

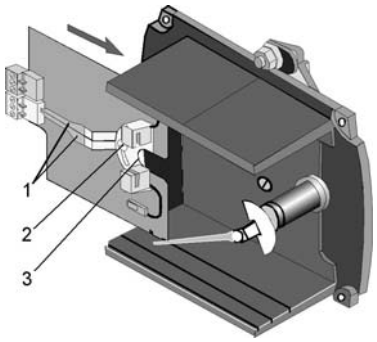
9.1 Contact insert

Bring the contact pointers (1) together in the center

Loosen the locking screw (2) of the contact pointers

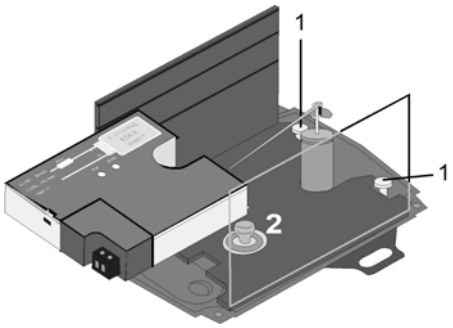
Slide the contact insert into the third rail until the semicircle (3) encloses the pointer support.

The connecting terminals of the contact insert have a pluggable design and can be removed in order to connect the lines.



9.2 Installing an ESK

Assembly is based on the plug-in technique.
Insert the push-in lugs of the ESK under the two studs of the baseplate (1).
Using slight pressure, press the ESK on to the spring bolt (2) until it locks home and is securely fastened.



10 Maintenance

The flowmeter is also to be inspected for soiling, corrosive erosion and mechanical wear or damage to the measuring tube and the display in the context of the routine operational maintenance of the installation and the pipelines. We recommend at least annual inspections. In order to clean the instrument remove it from the pipeline.

Note
Pressurized lines have to be relieved before the measuring unit is removed.
Corresponding safety precautions with regard to residual liquids in the measuring unit in case of instruments which are used to measure aggressive media.

New seals must always be used when remounting the measuring unit in the pipeline.

Electrostatic charges are to be avoided when the surfaces (e.g. viewing window) are cleaned!

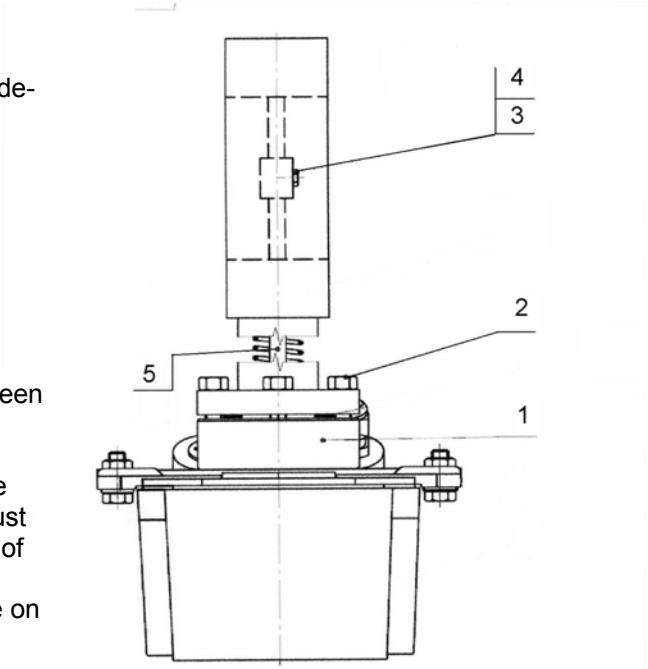
Maintenance

The device is normally maintenance-free. Should it become soiled, it will need to be removed from the pipeline for cleaning. Devices fitted with contacts must be disconnected from supply and de-energized.

To dismantle the device you will need the following tools:
2x open-jawed spanner, jaw span 13mm
1x open-jawed spanner, jaw span 7mm
1x screwdriver 4x 0.6mm
1x socket spanner, size 7mm up to DN 100 or
1x socket spanner, size 8mm, up to DN 250 or
1x socket spanner, size 10mm, for DN 300 and higher.

Required spares: 2x gasket

If necessary, wear personal protective gear (safety goggles, protective gloves, conductive footwear).
Depressurize the pipe.
Caution: Slacken screws/bolts only when the system has been de-energized, the pipe depressurized and free of fluid product.
Drain the pipes.
Remove the device from the pipeline in the reverse order
Detach the dial gauge with magnet casing from the neck of the device by removing the four M8 screws (Item 1 or 2).
Unscrew the fastening screws (3) between spindle and flap (4).
Pull the spindle together with the magnet casing and the spring assembly (5) out of the device.
Clean all mechanical parts with appropriate cleaning agents. If necessary, clean the indicator part with a damp cloth that has been rinsed in soap suds and wrung out.



Reassemble in the reverse order, paying special attention to the position of the flap. The bearing marked with a centre punch must point towards the spring. Do not change the original orientation of the flap (maintaining the direction of rotation appropriate to the indicator part). The flap requires a minimum of 1 mm clearance on both sides (risk of jamming and sparking).

Hazardous areas: Do not on any account remove the labelling on the scale casing containing information on explosion protection.

Information on returning instruments

Your instrument has been manufactured carefully and tested several times. If installed and operated in accordance with these instructions your instrument will rarely present any problems. Should you nevertheless need to return an instrument for checking or repair, please pay strict attention to the following points:

Due to statutory regulations concerning protection of the environment and safeguarding the health and safety of our personnel, KROHNE may only handle, test and repair returned instruments that have been in contact with liquids if it is possible to do so without risk to personnel and environment.
This means that KROHNE can only service your device if it is accompanied by a certificate in line with the following model confirming that the device is safe to handle.

If the instrument has been operated with toxic, caustic, flammable or water-endangering liquids, you are kindly requested:

- To check and ensure, if necessary by rinsing or neutralizing, that all the cavities in the instrument are free from such dangerous substances. (Directions on how you can find out whether the primary head has to be opened and flushed out and neutralized are obtainable from KROHNE on request.)

- To enclose a certificate with the device confirming that the device is safe to handle and stating the liquid used.

KROHNE regret that we cannot service your device unless it is accompanied by such a certificate and thank you for your understanding.

Form for returning the instrument

Company: ..... Address: .....

Department: ..... Name: .....

Tel. No.: ..... Fax. No.: .....

The enclosed instrument
Type: .....

KROHNE Order No. or Series No.: .....

has been operated with the following process liquid: .....

Because this process liquid is water-endangering * / toxic * / caustic * / flammable *

we have
- Checked that all cavities in the instrument are free from such substances *
- Flushed out and neutralized all cavities in the instrument *

(* delete where not applicable)

We confirm that there is no risk to man or environment through any residual liquid contained in the instrument.

Date: ..... Signature.....

Company stamp: